Appendix B
Cost Estimate Methodology

Under the various land retirement alternatives, the size and capacity of drainage features needed to collect, transport, and dispose of the irrigation drainage is expected to decrease as land retirement increases. Costs of a number of drainage features could be estimated using a flat rate per acre, depending either on the number of acres to be drained or on the size of the particular feature. For example, the cost of on-farm drains can be estimated by multiplying the number of acres expected to have drains installed under a particular alternative by a flat cost ($665) per acre. However, several features could not be accurately estimated using a flat rate. Therefore, a methodology to quickly estimate the cost of a large number of land retirement scenarios was developed.

The cost estimating methodology incorporated the use of cost curves to estimate both capital and annual operation, maintenance, replacement, and energy (OM&R) costs of those project features that could not be estimated using a flat rate. Capital costs, as well as annual OM&R costs, of each project feature were estimated for several different sizes based on projections of the amount of drainage expected to occur under the range of land retirement alternatives identified. These cost estimates were then used to define a set of cost curves and cost estimating equations to estimate the costs of each feature as drainage quantities changed under each land retirement alternative. Cost estimating equations are shown in Tables B-1 and B-2.

Table B-1
Cost Estimating Equations for Capital Costs

Project Feature	Estimating Unit	Cost Estimating Equation
Source Reduction Measures		
Drainwater Recycling	Acres	$167/acre
Shallow Groundwater Management	Acres	$0/acre
Seepage Reduction	Acres	$0/acre
On-Farm Drains[1]	Acres	$665/acre
Reuse[1]	Acres	$4450/acre
Collection System (Block/mandatory)[1]	Acres	$750/acre
Conveyance System (In-Valley)	cfs	$y = -11{,}857.7x^2 + 1{,}424{,}532.5x + 10{,}574{,}611.3$
Reverse Osmosis	Acre-feet	$y = -0.0192x^2 + 1{,}213.2x + 5{,}164{,}081.8$
Selenium Treatment	cfs	$y = -9628.8\ x^2 + 4055421.9\ x + 3758064.7$
Evaporation Basins[2,3]	Acres	$y = -0.6879x^2 + 11{,}769.5x + 3{,}886{,}201.2$
Mitigation Basins[3]	Acres	$y = -0.9030x^2 + 9{,}863.8x + 6{,}395{,}594.3$
Land Retirement[3]	Acres	$3,021/acre

[1]Capital costs are based on acres of new features constructed for the alternative.
[2]Capital costs are based on acres of evaporation basins required to accommodate peak flows.
[3]Capital costs include land acquisition costs of $2,600/acre.

Table B-2
Cost Estimating Equations for Annual Operation & Maintenance Costs

Project Feature	Estimating Unit	Cost Estimating Equation
Source Reduction Measures		
Drainwater Recycling	Acres	WWD = $2.40/acre Northerly Area = $4.40/acre
Shallow Groundwater Management	Acres	$18.8/acre
Seepage Reduction	Acres	Based on Source Control Technical Memo (June 2002)
On-Farm Drains[1]	Acres	$9.40/acre
Reuse[1]	Acres	$200/acre
Collection System (Block/mandatory)[1]	Acres	$12.00/acre
Conveyance System (In-Valley)	cfs	$y = 83.387x^2 + 9860.8x + 21209$
Reverse Osmosis	Acre-feet	$y = -0.0085x^2 + 341.2281x + 47135.4484$
Selenium Treatment	cfs	$y = -207.95\ x^2 + 131373\ x + 102664$
Evaporation Basins[2]	Acres	$y = 0.0009x^2 + 122.2386x + 2436.7570$
Mitigation Basins	Acres	$100.00/acre
Land Retirement	Acres	$17.25/acre

[1]OM&R costs are based on acres of new features plus existing features.

[2]OM&R costs are based on acres of evaporation basins estimated for annual average flows.

The cost curves generated to estimate capital costs of project features having a non-linear cost function are shown below on Figures B-1 to B-5. OM&R costs curves are shown on Figures B-6 to B-9.

Figure B-1
In-Valley Conveyance - Capital Costs

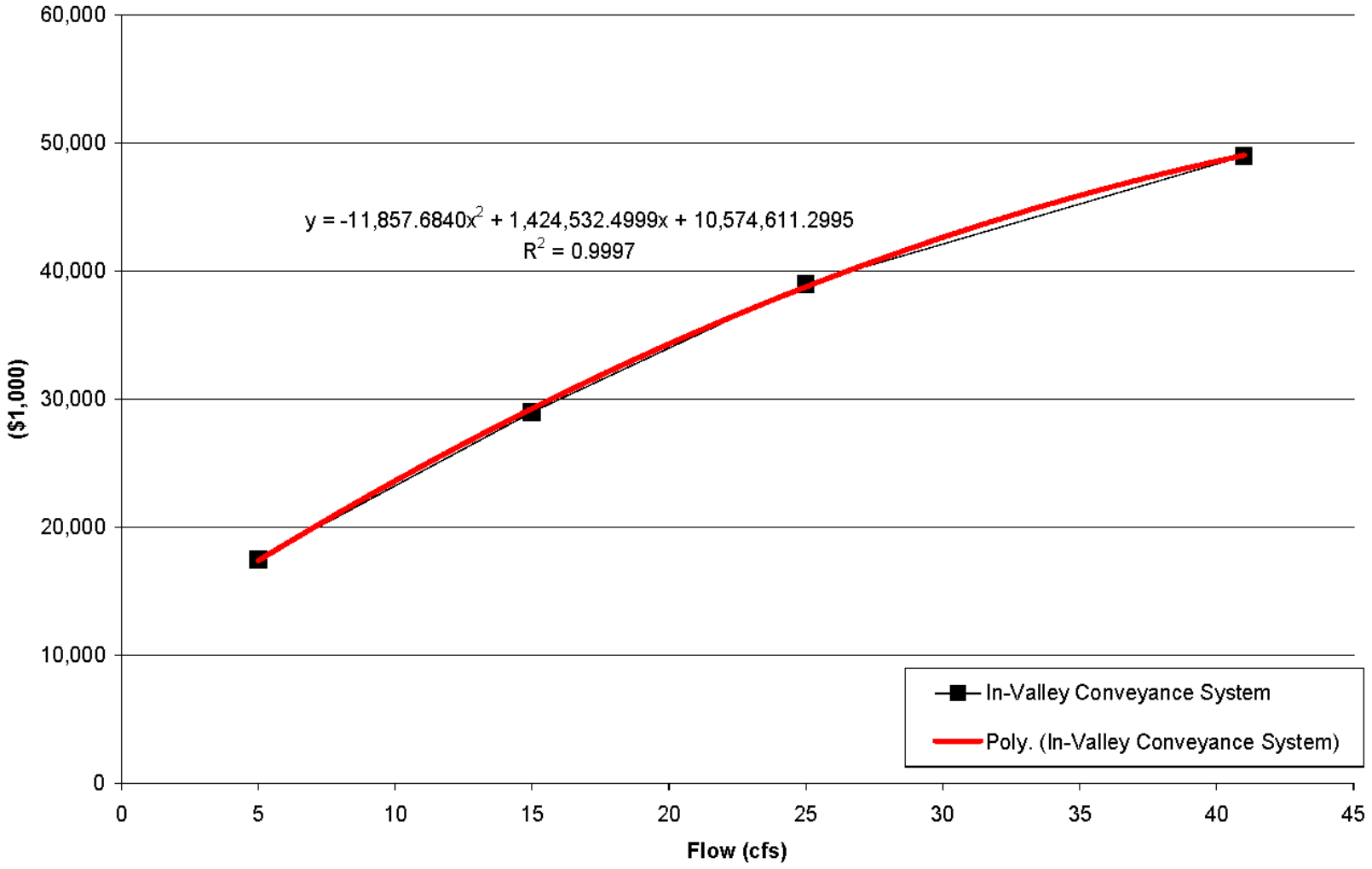

Figure B-2
RO Treatment - Capital Costs

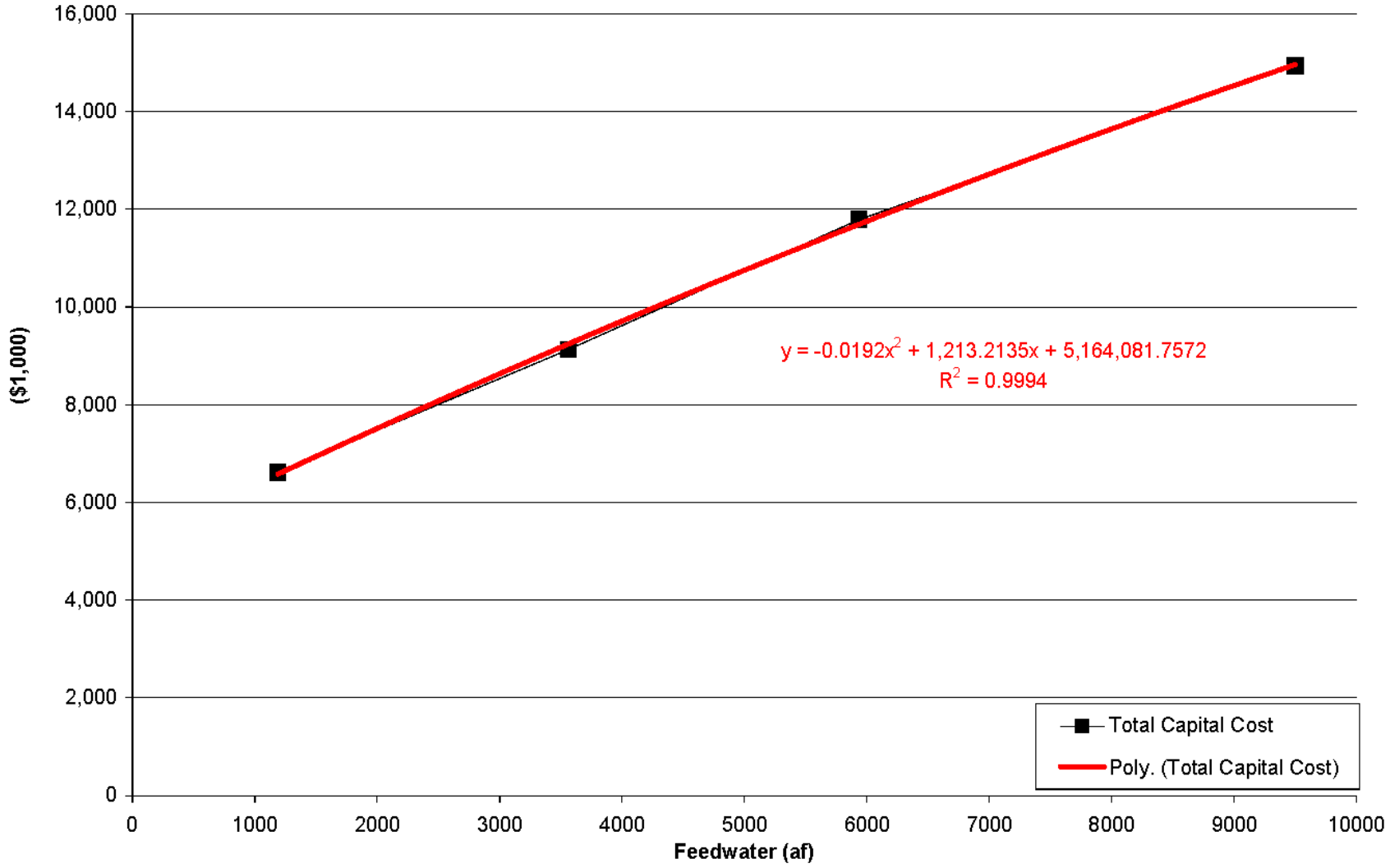

Figure B-3
Se Treatment - Capital Cost

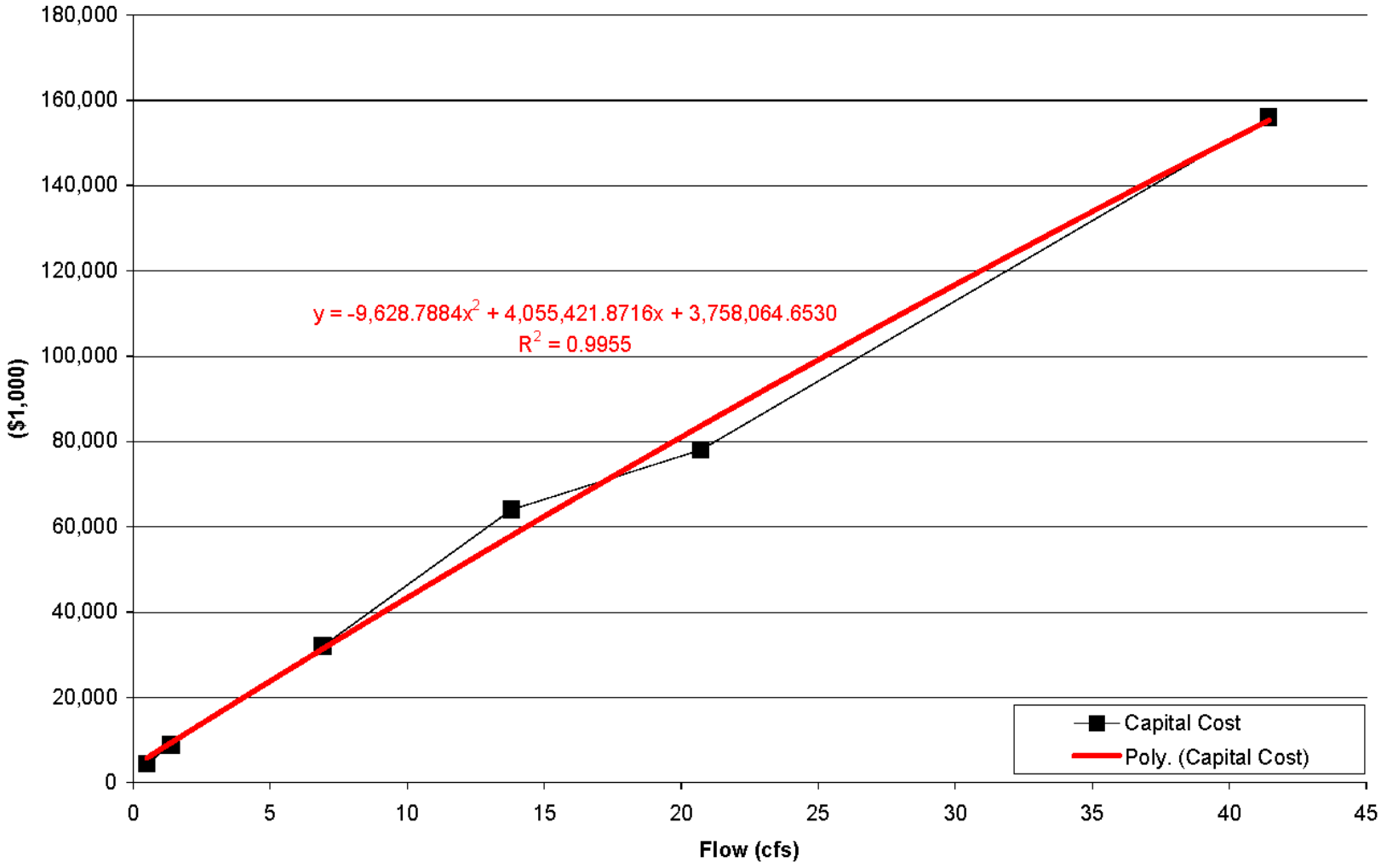

Figure B-4
Evaporation Ponds - Capital Costs

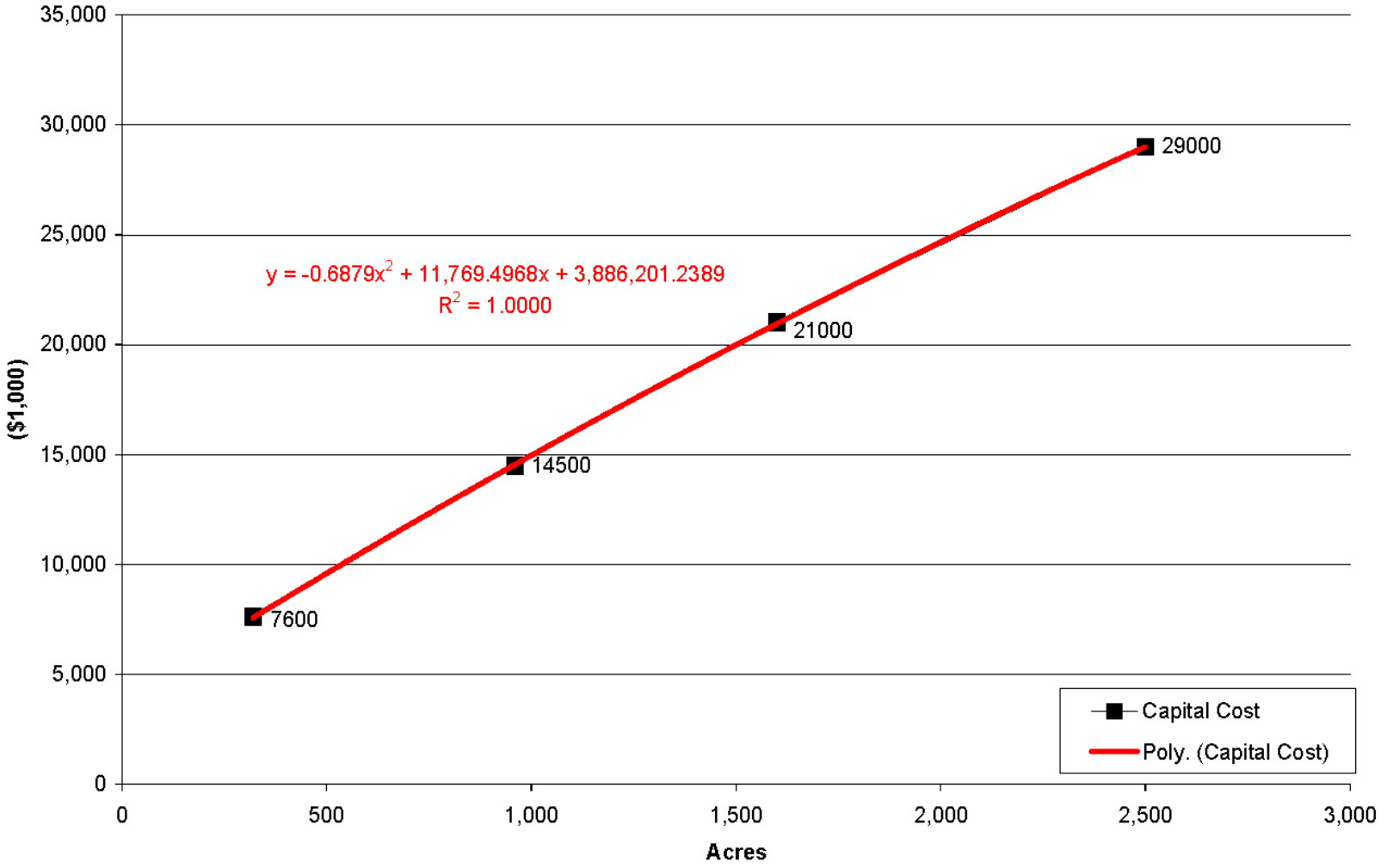

Figure B-5
Mitigation Facilities - Capital Costs

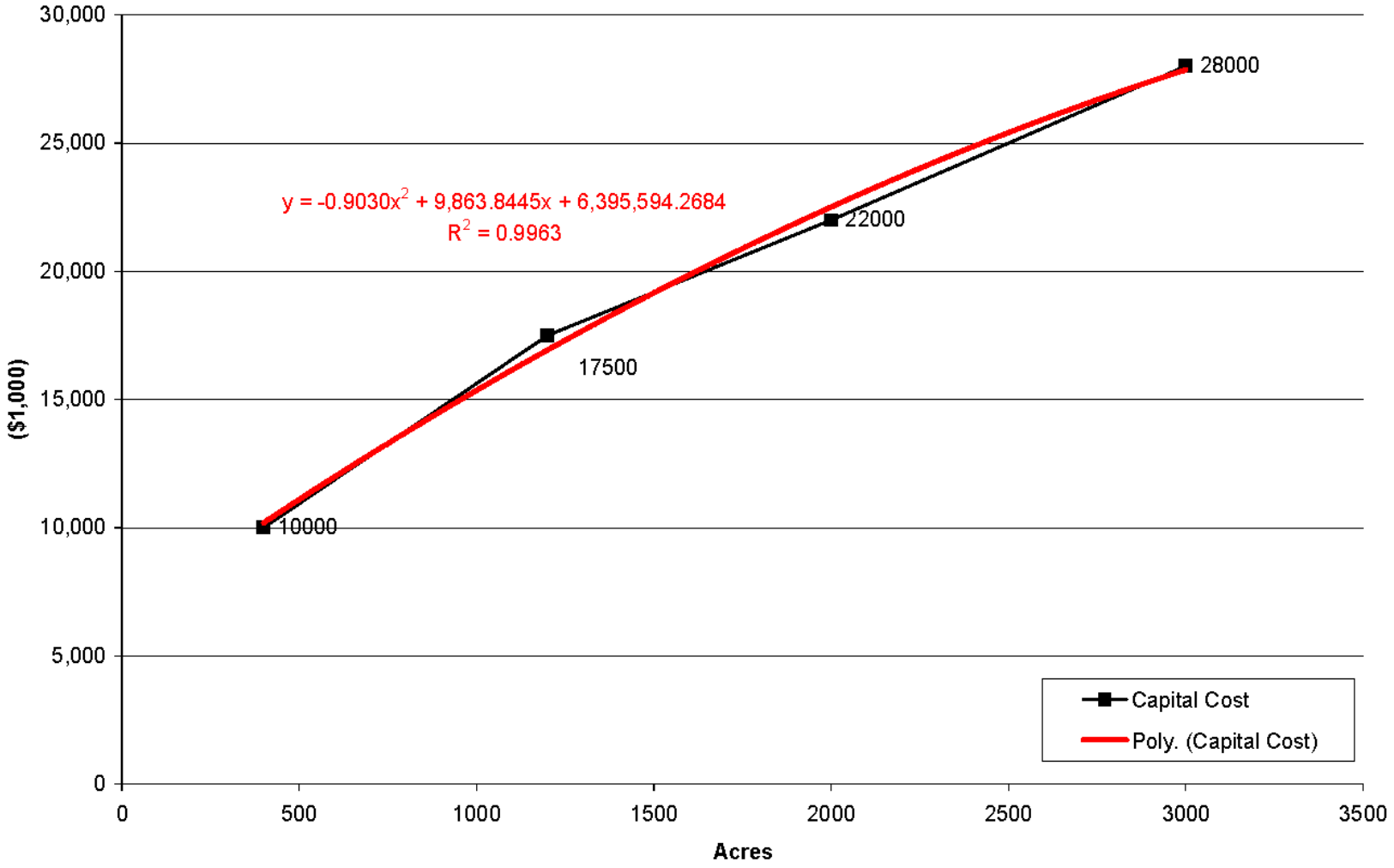

Figure B-6
In-Valley Conveyance - Annual OM&R Costs

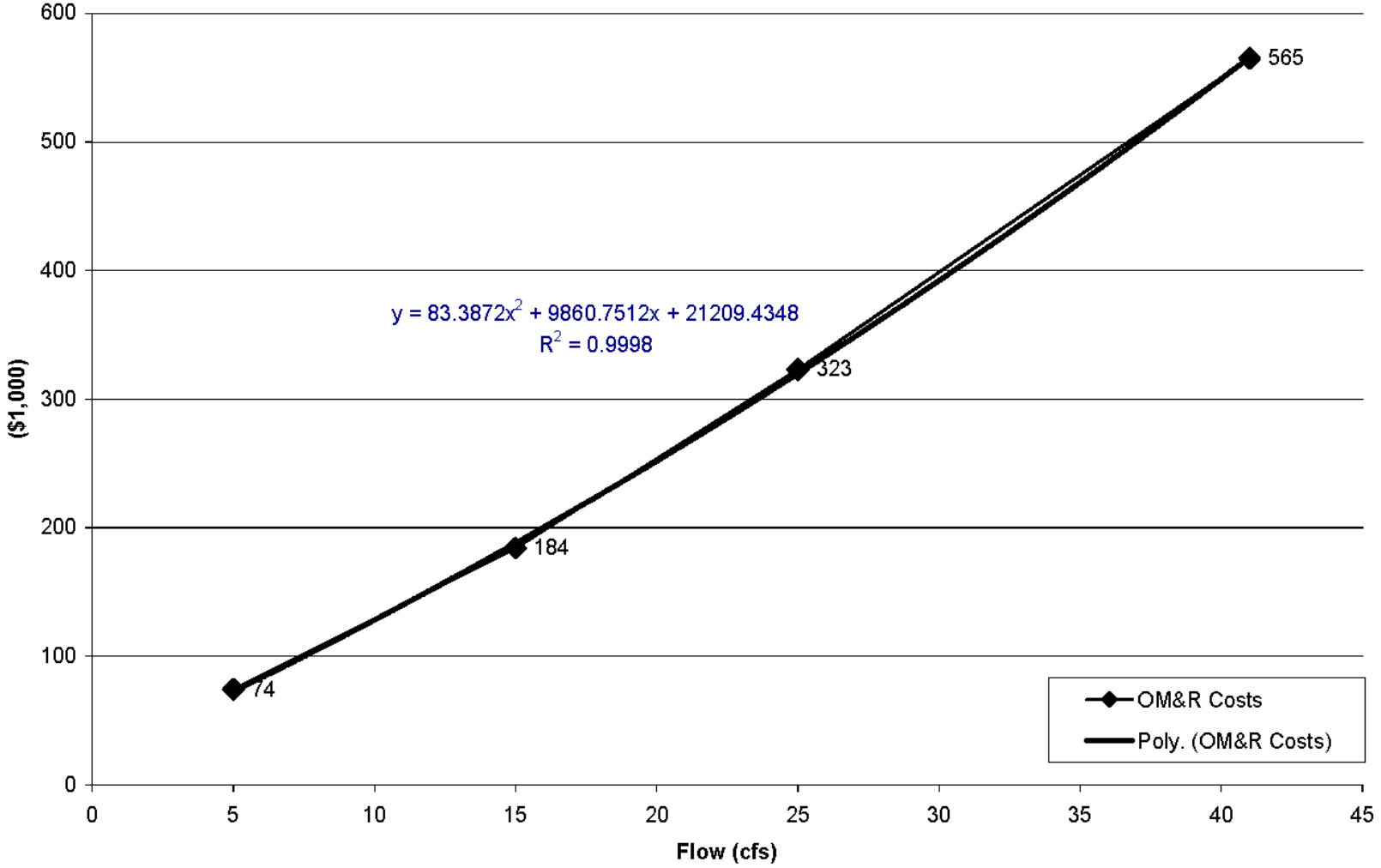

Figure B-7
RO Treatment - Annual OM&R Costs

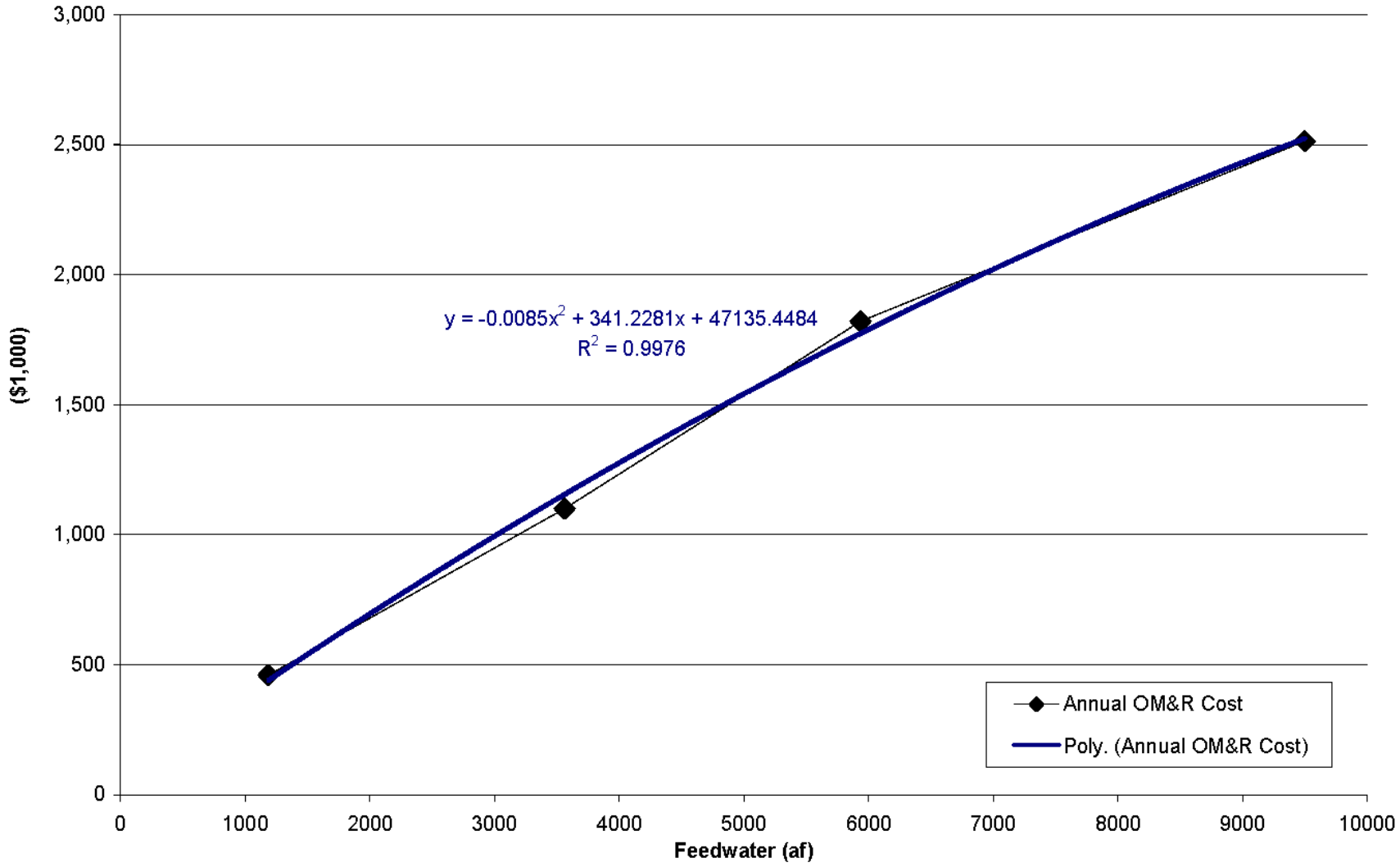

Figure B-8
Se Treatment - Annual OM&R Costs

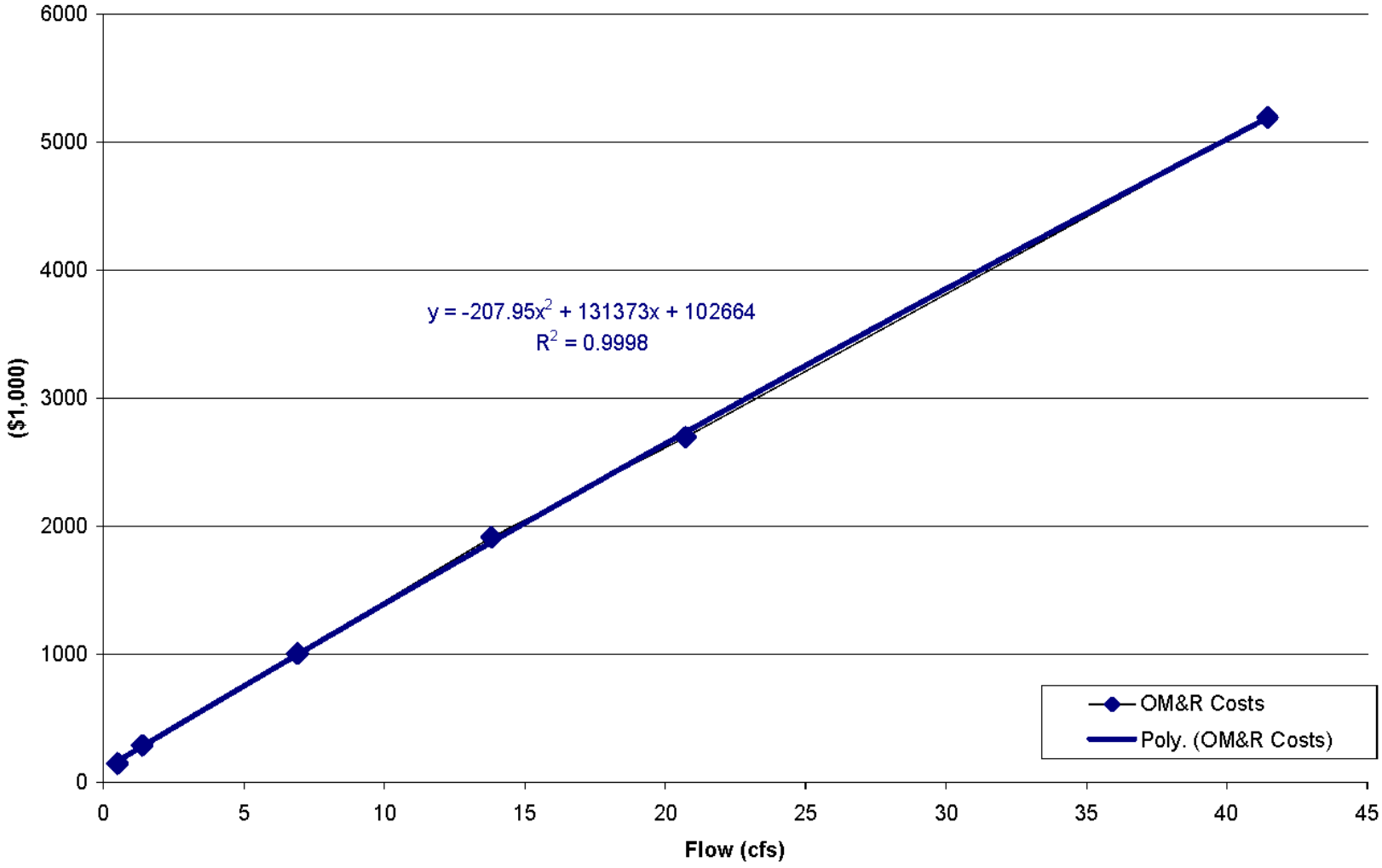

Figure B-9
Evaporation Ponds - Annual OM&R Costs